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## Rail-Road News.

**Railroad Through Canada to the Pacific.**

A work has been published in London by two gentlemen, named Wilson and Richards, urging upon the British Government the policy of constructing a railroad from Halifax, via Quebec, across the Canadas, near the border line, to the Pacific. It proposes to employ on the work all the convicts and paupers of Great Britain, besides other portions of the surplus population, of which, it is averred, more than five millions may be spared; to erect Canada into an integral part of the kingdom, to be represented in Parliament; to govern it by a vice-royalty; and to establish there a nobility and all ranks of society corresponding to those of England.

The length of the proposed road was two thousand eight hundred miles; the estimated cost an average of £5,000 per mile, or £14,000,000 for the entire work—a sum less than half the present annual cost of pauperism in Great Britain, which this proposes to save by transferring the paupers to Canada, where it is expected they will become independent of public charity.

The great object of this railway is the Chinese trade. There are strong fears of the American Pacific Railway taking away the China trade from Britain, and this will no doubt yet take place. Neither convict nor "pauper labor" (what is pauper labor?) can redeem Canada, by a railroad, from being defeated in the strife of competition with the United States.

**To Cleanse and Improve the Hair.**

Half an ounce of ammonia to a pint of boiling water; let it stand till cold; put it into a bottle and cork it, to keep it from evaporating. Rub it on the head in a piece of flannel, when it will lather like soap; rub dry afterwards with a towel.

**To Cleanse the Hair.**

It is recommended to use a little soda in the water instead of soap. Rosemary steeped in water cleanses the hair nicely; or an egg, well beaten and mixed in warm water, has the same effect.

**To Remove Freckles.**

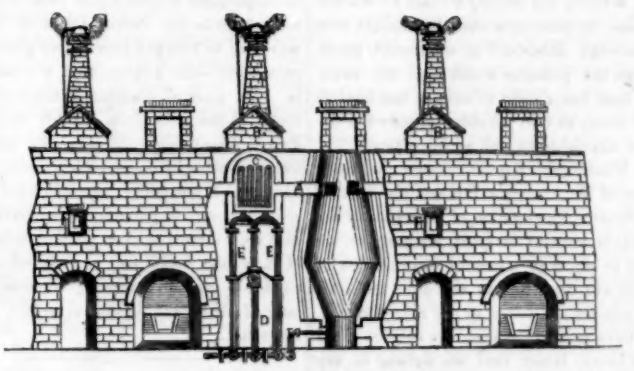
Freckles may be removed we are told, but do not vouch for it, by the frequent application of spirits diluted, or alkaline solutions, the latter of just sufficient strength to prick the tongue.

**Perfumes for Pocket-Handkerchiefs.**

Half a pint of rectified spirits of wine, a quarter of an ounce of oil of lavender, five drops of essence of ambergris, well mixed together.

A London ship-builder has challenged the world to build a swift sailing vessel. He does not care what the tonnage may be. The challenge has been published in the London Times. Some of our ship-builders will surely take him up and beat him out and out.

## IMPROVEMENTS IN BLAST FURNACES---Figure 1.



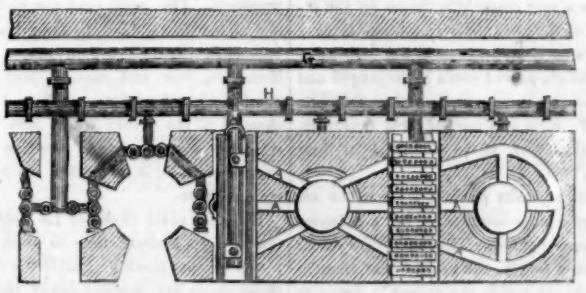
Having had many inquiries about the blast furnaces of Mr. J. P. Budd, which appeared in a paper read before the British Association, we here present engravings of the same; and, as the interests in blast furnaces, in our country, are not small, we presume that the subject will be of general interest. The Germans appear to have devoted the earliest attention to save or use over the heated gases proceeding from the tops of blast furnaces. A work upon the subject was published in 1840, and a number of expensive plans to economise the said gases, were got up, tried for a while, and then abandoned, until about 1844, when Mr. Budd, of Swansea, Wales, took up the subject and experimented with the following results.

The experiments were made at Ystalyfera Iron Works, where anthracite coal is used, the production of the furnaces being only 50 or 60 tons per week; and consequently the cost of the hot air furnaces, consuming together 35 tons of coal per week, with the constant attendance of a man, all fell upon this small quantity. The heating stove was built by the side of the furnace, from which it is quite detached, and by a chimney 25 feet higher than the furnace top, as much of the escape gases and heat was drawn in as was necessary.

The arrangement is explained in figs. 1 and 2, which are respectively an elevation and plan of three furnaces conjoined. The ordinary operations of the furnace are not in any way interfered with. A series of horizontal flues, A A, 12 inches in diameter, are formed in the furnace walls, about 3 feet below the top, leading into chambers, B B, each of which has a chimney to produce the requisite draught. These stoves contain ranges of hot-air pipes, C C, upon which the escape gases act in passing through the stoves. The inlet pipe for cold air is at D, whilst the outlets for the hot air to the twyeres at are E E. Iron doors are fitted at F F, for the admission of cold air to the stoves. The cold-blast main is at G, the hot-blast at H.

The plan view gives a horizontal section of two furnaces to the left, with the hot-air tubes of the stoves, and a ground plan of one to the right, giving the arrangement of the twyeres. By the use of dampers fitted to the top of the chimneys, the supply of gases may be regulated to a nicety. The quantity required to the hot-blast of a furnace, is not more than one-sixth of that which passes off from the furnace. The combustion of the gases is not attempted; they ascend and enter the stove at a temperature of about 1,800°, and leave it at 800°; all the heat required, being at 600°, their mere passage through, produces all the heat necessary, whilst no injurious effects ensue from combustion. At three feet below the surface of the materials, there is very little combustion; for as the vapors reach the top of the chimney, and come in contact with the atmosphere, a bluish flame, visible at night, bursts out, but is quickly extinguished by the reduction of temperature below that of the combustion of the compound gases. When the materials are allowed to fall below the mouths of the flues, combustion occurs previous to entering the stove, and the vaporous exhalation disappears.

Figure 2.



The great feature of this system is the fact of its not requiring any additional coal or labor for producing a practically good hot-blast, well heated and regular. The first stove of the kind was erected in Nov. 1844, and as it is now in good repair, it is presumed that its action is most economic.

Should the furnace stop for a short time from any casualty, the damper is lowered, and the stove is closed full of heat, to be ready for action at once. In obtaining the requisite heat upon blowing in a furnace, a cold-blast load is put on for the first day's melting, after which the stove becomes dry, and gives out hot-blast *per se*. If the stove is of green masonary, a small fire is put in at the door, until the draught acts properly through the flues. A curious circumstance occurred in the first stove, where the damper had been left down until it arrived at the point of explosion, when it blew down the front of the furnace. With the damper up, this can never happen.

For cooling the stoves, when it is necessary to enter them, the doors, F F, are provided. The damper being let down, the draught from the furnace is stopped, whilst the stove door is opened to admit cold air.

In six furnaces at Ystalyfera, the whole are placed in a row, and joined together by arches—and upon these arches, the stoves, five in number, are erected, each stove being between two furnaces, with pipes from each.

The saving involved in the process is calculated by Mr. Budd at 33 tons of anthracite, at 4s., the attendance of two men, and wheeling coal and ashes, £2, the total being £8, 12s., per week, or $40 without calculating the economy in the repairs of stoves.

Not only is the gaseous escape rendered valuable in the way we have mentioned, but it is further applied in raising steam for the engine. Not more than one-sixth of the escape is really employed in the smelting process; but even this fraction does the work of from 10 to 35 tons of rubbly anthracite coal per week, burnt in the common reverberatory furnaces, whilst the remaining five-sixths are suffered to escape into the open air. In applying a portion of this lost matter for raising steam, two flues, 24 inches diameter, were formed, leading into a main flue, 32 inches diameter, connected with the tube of the nearest steam boiler, the distance from the furnace to the boiler being 46 feet. The boiler tube is divided by a brick partition into two compartments, the heated vapors passing four times through and beneath the boiler, the aggregate flue passage being 120 feet. The chimney is 6 feet diameter, and 80 feet high, having a very strong draught, which takes off the gases from the furnaces and fills the boiler with the heated vapors. The whole 46 feet of flue between the furnace and the boiler is carried on supports like a bridge, through the open air, still, in the face of the loss from cooling, the boiler now raises twice its former quantity of steam, and the resultant saving on this head alone is equal to 35 tons of coal per week. It is in contemplation to use the furnace vapors alone, in raising steam, so as to be totally independent of coal, excepting for starting with.

**Progress of Astronomy.**

The Academy of Sciences in Paris has awarded the Lalande Medal to M. de Gasparis for his discovery of the planet Hygeia, in April 1849; and shared its astronomical prize for 1850 between him and some others, for his discovery, in May last, of Parthenope, and in November of another, yet unnamed, the Victoria on the 13th last September, another since named Egeria. It is the thirteenth planet or asteroid now known to exist between Mars and Jupiter, nine of which were discovered in the course of the last five years, and three in six months of 1850. The first of the thirteen was discovered on the first day of the last half century, and the thirteenth within a few weeks of its close.

Four of the thirteen were discovered in Great Britain, four in Italy, and five in Germany, by seven observers only—M. Hind and Prof. Gasparis having discovered three each, and Piazza, Harding, and Graham one each. Metis, which was first seen by Mr. Graham at Mr. Cooper's Observatory, Markree Castle, Ireland, is believed to be the smallest of the thirteen, as when nearest it does not appear brighter than a star of the eleventh magnitude, whilst Vesta appears of the sixth.

Lieut. Maury officially informs the Washington Republic that this last new planet, "Egeria" was observed at the National Observatory in Washington on the night of the 25th December. He gives its apparent position, and says:—this planet also belongs to the family of Asteriods. It is the thirteenth of the series, and its appearance is that of a star of the eleventh magnitude.

Gliddon has been unswathing two heathen Egyptian Mummies in Philadelphia.

# Miscellaneous.

### Bills for Reforming the Patent Laws.

In addition to what we said last week, upon this subject, we present a few more remarks, this week, as a continuation of the subject:

Sec. 6—And be it it further enacted, that in all cases the defendant will be allowed to plead non-infringement of the patent, and to produce the testimony of witnesses to that effect. He shall also be allowed to adduce the testimony of witnesses, or that of printed periodicals or books, to prove the invention not to be new and the production of the complainant, which shall be questions of fact for the jury. In all such actions for the infringement of Letters Patent, it shall be the duty of the Court, before whom the same may be commenced, to instruct the jury to find the actual damages sustained by the plaintiff by reason of such infringement, and if the verdict be for the plaintiff, the Court shall endorse the result thereof upon the Letters Patent, and in all subsequent actions for the infringement of any Letters Patent having such endorsement, it shall be the duty of the Court to render judgment for a sum equal to twice the amount of the actual damages found by the jury, with double costs and reasonable counsel fee, to be allowed by the Court, and to issue execution therefor against the goods and estate of the defendant.

Sec. 7—And be it further enacted, that any person may apply, at any time, to any of the Courts of the United States, for a writ of *scire facias*, to test the validity of a patent at one of the Courts by a trial at common Law—the person applying for such a writ must make oath that he believes the patentee complained of is not the original and first inventor of the invention claimed in his patent, and he must produce testimony of witnesses upon oath to that effect. The patentee complained of must be notified of the time when such application for a writ of *scire facias* will be made and the reasons for such an application by the complainant, at least twenty days before the day of application, in open court, when the court, upon the testimony adduced, may grant such a writ, ordering the trial of said writ to take place at the next term of the Court. But no person or persons, against whom an action for damages for infringement of a patent has been commenced by the patentee or his assignees, shall be entitled to apply for such a writ, until the case for which he is the defendant, is decided.

Sec. 8—And be it further enacted, that after a trial at common law, wherein the jury has decided the patent to be invalid, the defendant in the case tried, may move the Court to cancel the patent, and the Court, according to the circumstances of the case, may order the said patent to be cancelled, either in whole or in part. In every case the patentee shall be allowed full protection of the Court, to any claim for a new and useful improvement, although one or more claims may be for something old and inoperative.

Sec. 9—And be it further enacted, that it shall be the duty of the Commissioner of Patents to cause to be prepared a general, analytical, and descriptive index of American discoveries and inventions, and continue the same from year to year, and so much thereof as shall have been prepared during each year, shall accompany and form a part of the annual Report of the Commissioner of Patents.

Sec. 10—And be it further enacted, That the Commissioner of Patents be authorized to employ temporary clerks, at reasonable salaries, to do any necessary draughting or transcribing, whenever the business to be performed in the Patent Office requires it.

[The two last sections, nearly word for word, are taken from Senator Davis's Bill. We have selected portions from all the bills in our possession, and we believe, that we have presented amendments to our Patent Laws, which are founded on justice to the inventors and the public. We ask any Senator, or any man who has copies of such bills, to read them and compare them with the amendments we here present, and those we presented last week. The writ of *scire facias* we have embraced in these amendments—but not in the same way as it is in Senator Turney's bill. As it stands in that bill, it is certainly objectionable.

The great complaint with patentees against our present laws, is this:—any person sued can deny the validity of a patent; in consequence of this a patentee has the same battle to fight over and over again, perhaps a hundred times, during the term of his patent. In other cases than those of patents, one trial at common law, unles exceptions are taken, decides the case finally—not so with patents; every new patent trial is a duplicate of the first. What is the remedy for this? We can find none, for every new case is different from another—the defendant is a different party, although the patentee is one and the same. Every man has a right to have a fair trial in patent cases, as well as other cases—the defendant has rights as well as the plaintiff.

The Washington Republic comes out strong in favor of Mr. Turney's Bill and the writ of *scire facias*. The opinion of the editor of the Republic is entitled to great weight, yet we venture to say that a careful examination of that bill will lead him to conclude that too much latitude is allowed to the *scire facias*.

We have said so much on the subject of the Patent Laws, lately, that we forbear to say any more at present, excepting to call attention to the amendments we have set forth last week and this. There is a strong party of lobby members now in Washington, urging the passage of Mr. Turney's bill, and petitions have been circulated in New York, praying Congress to suspend all action on it at this Session.

### Correspondence of the Herald, Scire Facias and Stealing Inventions.

I observe that the "Herald" is not entirely satisfied with the *scire facais* process which the Senate Committee on Patents have reported as an amendment to the patent laws. Allow me to state a fact:—A year or two ago, there was a person in the Patent Office, acting in the capacity of an assistant examiner. That person is now established in a large Western city as a patent agent. Not long ago, an inventor of a new and most admirable plan of a stove, applied to this patent agent to assist him in obtaining a patent for his invention. The patent agent got the poor inventor's money, and then took out the patent for the invention in his own name, and now holds it, and is making money out of it. He is ready to make suits against anybody and everybody, including the real, honest, but defrauded inventor himself, who may dare to have stoves made after the style and manner of his patent.

Suppose he were to commence suits against fifty manufacturers, or companies, for an alleged infringement of his patent, would there not be here a very suitable occasion for the introduction of the *scire facais* process, to stay proceedings on these suits until the validity of the prosecutor's patent could be adjudged and decided upon by the courts in which the suits were laid? How else are the real inventors, served in this way, to be protected in their just rights?

If the *scire facias* process were to be attempted upon suits commenced by a patentee whose patent is genuine, the said *scire facias* process would fall to the ground the moment the court should decide the patent in issue to be valid. The rights of the real inventor would here be protected, the same as when suits should be commenced by a party having an invalid patent.

I am credibly informed by one of the officers of the Patent Office, that cases often occur like the one given of the patent agent out West, who pirated the valuable invention he had been employed to get a patent for.

Show me a better system of securing to the real inventors their just rights from piracies of this nature, than the proposed *scire facias* process offers, and I will go for it heartily.

[The above is from the Washington Correspondence of the New York Herald. He evidently does not understand what the *scire facias* is. He talks as if there were a great number of forged patents flying about. There is no such thing as a forged patent in existence. All the patents are genuine bills of government issue. The questions to be decided in patent suitsare, "is the patentee the *first*" inventor? Is the patent infringed?"

The name of the Patent Agent mentioned above should have been given. We like to be plain and open, and no such charge should be made without the names given. The above states that one of the officers in the Patent Office informed the said correspondent that such cases often occur. The Patent Office must certainly be a corrupt place, then, when it is good only for making pirates. This is the logic of the sentence. We venture to say that no respectable Patent Agent (who has not, at least, been in the Patent Office to learn the way) can be brought forward as guilty of any such crime—for a crime, and a black one, it is. We have no confidence, however, in the truth of the averment. Surely there is no Patent Agent (once, or never, in the Patent Office) capable of doing such a wrong. It has been, and is our policy, never to have any personal interests in patents, for we have judged that such interests, even without being aware of it, would make us, to a degree at least, partial to our own interests; whereas, it is the duty of all Patent Agents to be free, fair, and impartial.

### Cave Villages in France.

On the banks of the Loire, near Tours, in France, there are villages dug out of the rocks, and where the people live, if in caves, still in comparative comfort and contentment. Where the river contracts, the banks are formed of precipitous cliffs of limestone, relieved with green spots of pasture, woods, and vineyards. The rock is easily worked, and is thus scooped out into dwellings. In many instances the houses are of several stories, with windows and chimneys cut in the limestone, the outward orifice appearing like a small black spot, buried, as it were, in clusters of vines, which scramble along and hold on to every crevice and eve-like projecting table land where a morsel of soil has lodged. There are quite a number of such villages; La Roche Corbon, about five miles from Tours is a very interesting one. The caverned houses strike a stranger at first by the appearance of glazed windows placed in what appears to be the solid rock. At first, however, the expedient seems principally resorted to with the view of furnishing cellars and hay lofts for the long row of white villas which extend fully three miles from Tours, dotting the steep declivity of the bank, and overlooking gardens of apparently boundless fertility. It is only a close inspection which shows the high walls by which these latter are enclosed; the masses of festooning vines, and the forests of honeysuckle, ivy, and trained fruit trees, dressing them in mantles of green, which completely conceal the rough masonry. The main road lies upon the summit of the great dyke, built to keep the "revolutionary Loire" within proper bounds.—Meadows, low and marshy, and frequently overflowed, extend between it and the actual channel of the river; while here and there, where the ground rises in swelling knolls from the water side, it is clothed with forests of walnut trees.

Upon the main street of La Roche Corbon, the cottages beneath may be seen built with rough stones leaning against the rock, while those above are scooped out of the rock, approached by steps cut in the same. The whole face of the rock is scooped into rooms stretching away back into cells, and the windows are set here and there, without any regularity. The outside galleries and stairs run from ledge to ledge, and the people are now appearing at one black hole in the bank, and anon disappearing at another.

The walls, and every part, are festooned with vines, flowers, and garden plants. Every plateau of table land, though only a yard square, is assiduously cultivated, and every ledge, and the nooks and corners of every crevice and petty ravine, worked up into garden ground, surrounded by fences of loose stone, and vine draped, every one of them. All the houses are kept very clean; the steep sloping of the banks prevents the accumulation of liquid filth, and, as a general thing, the houses are all neatly and tidily furnished. The back rooms, which are ill-ventilated and dark, are chiefly used for lumber rooms and cellars. These houses are generally healthy, they are dry and perfectly free from damp. The people are small proprietors, and have patches of vineyards on the hill, with corn, pasture, and wood patches, running back into some of the valleys which here and there run down transversely to the river. The women employ themselves, in running off the thread from the cocoon of the silkworm for the manufacturers in Tours, but their pay for this is so small that they never use candles, as, besides attending to their household duties, they can only make about 7 cents per day; but this is much better, taking all things into consideration, than can be made by many of the seamstresses, either in London or New York. A great deal of wine is made, and the men can mostly all do something as coopers. The limestone rock, as a drawback to many comforts, has a tendency to crumble, and sometimes a fragment rolls down from its seat; but, taking all things into consideration, the people live comfortably, and perhaps more curiously than any other in the world.

### A Physiological Problem.

It has been observed that persons who have lost a limb, or a part of one, are at times very much troubled with an intolerable itching, or sometimes pain, in the fingers or toes of the extremity which is lost. A case of this kind lately presented itself to us for advice, which, being a little out of the common course, we have thought proper to give to our readers. A young man had his arm amputated just above the wrist, on account of having it shattered by the bursting of a gun. This happened some two years since, and the deficiency is supplied by a wooden hand.

At times, he tells us that he has the most intolerable itching between these wooden fingers, in fact insupportable, and, to use his own words he would give a hundred dollars for the chance to give them a scratching. At other times, he has so much pain where the fingers should be, and he can only obtain relief by altering their position. When free from the pain or itching, he can discover no difference between that hand and the sound one. He can will the fingers of the lost hand to act, and they seem to obey. At times, the end of the fingers are quite numb and cold; being partly flexed, he feels that he has not the power to extend them. There are other phenomena connected with this case, which with those we have given, would be very difficult to account for on physiological principles.—[Boston Medical Journal.

[If every person who has had a hand amputated, was interrogated on the subject, they would relate an experience like the above. We know an old man of 60 years of age, who lost his hand in a machine, and he used to complain often of a tingling and itching as if at his finger points.

### Chloroform as an Antiperiodic.

The French Government has offered a prize of 4,000 francs for the discovery of a substitute for Quinine in the treatment of fevers. Prof. Delioux, of Rochefort, reccommends chloroform as a powerful succedaneum. Periodic fevers are common at Tochefort, and he treated numerous cases in the hospital there with such regularity of success that he feels warranted in recommending it as a substitute for Quinine. He gave it in doses from 9 to 30 grains, according to the severity of symptoms, rubbed up with syrup and water. It was administered before the access of fever, and its use continued for several days.

### Coinage in the U. S. Mint for 1851.

Gold, 2,261,079 pieces, such as double eagles, eagles, &c., amounting to $27,756,445—nearly 28 millions. Silver, 5,572,879 pieces, amounting to $28,166,045—a little over 28 millions—more silver than gold, yet. The total gold deposits were $33,150,000, of which $31,500,000 was from California. Thus our great Pacific Sister State contributed no less than $2,500,000 every month. Three years ago she had not sent a single cent. This is a great country, and can't be fenced in.

For the Scientific American.

### The Hygroscope.

It is a matter of general interest to know the condition of the atmosphere as regards the quantity of moisture which it contains—evinced by the never-failing subject of the state of the weather being introduced at all times, and by all persons; any simple means, therefore, which would immediately and satisfactorily give such information, might be regarded as a public benefit.

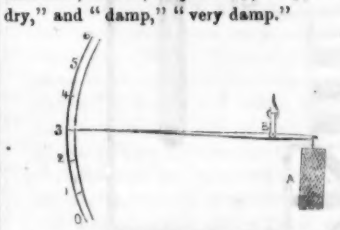
Hygrometers, or instruments for measuring the moisture of the air, are as old as the crust of the earth itself—for numerous substances of the mineral, animal, and vegetable kingdoms, in their natural condition, absorb moisture, and hence become more or less damp, depending on the hygrometric state of the atmosphere. Vegetables and animals, in general, swell in their dimensions by an increase of moisture, and many mineral substances liquefy or become damp. These principles have been applied to the construction of a variety of hygrometers; those of animal or vegetable matter being generally fibres or cords, which, by swelling in damp air, twist in their substance and thus move an index; or, by contracting in length, effect a similar purpose. It has been found, by experience, impracticable to construct any instrument of this nature which shall indicate exactly the gradations of moisture, they have, therefore, successively fallen into disrepute, and their place taken by the handsome scientific hygrometer of Prof. Daniell; even this fails in very dry air, from causes it is needless here to examine. These instruments all proposed to *measure the quantity* of watery vapor in the atmosphere, and failing to do this correctly, lost reputation.

The question suggests itself, "is the community in general interested in obtaining such information?" Probably not; most persons simply desire to know if the air be dry or damp, regardless of the exact quantity of watery vapor in a cubic inch.

An instrument is wished for to exhibit the change of the atmosphere, but not one to measure its quantity: hence a Hygroscope must take the place of the Hygrometer. There is one use for such an instrument of no small importance; I allude to the state of our rooms in the winter season, particularly those warmed by stoves. The dryness of the air which we respire, in such cases, is, perhaps, but little known. The amount of watery vapor that the atmosphere is capable of absorbing, is dependent entirely on its temperature. A room of air below the freezing point, has but a small quantity of moisture in it; or is, in other words, very dry; if its temperature be then raised—the doors and windows being closed—to a pleasant warmth, say 75°, what must be its condition? It was *very dry* at first, but has now been heated some 50° more, at least, perhaps with no more moisture than it originally contained; whilst, to keep it at the same state of dryness, it should have not less than four times as much. That is, if all the moisture of the air of the chamber could be condensed in each case, there should be at least four times the quantity in the warm room than in the cold one, to prevent its being more drying in its effects.

The injurious consequences arising from breathing, habitually, such excessively dry air, may well be imagined when we reflect that, at each inspiration it comes in contact with the immensely extended and very delicate moist membranous lining of the air cells of the lungs. Hence all are interested in ascertaining the true state of the air of our rooms, so that if too dry we may apply a remedy; and some instrument of simple structure is desirable, which shall indicate the condition of things in this respect. I propose now to describe one which I have used for the last five years, without once failing to give entire satisfaction; the principle is of course old, though the particular construction may be new. It is made as follows:—Take a small apothecary's scale-beam and suspend from one of its extremities a string of linen cloth—say one inch broad and six inches long—previously dipped into a moderately strong solution of pearlash; or, still better, of chloride of calcium: even common table salt will answer if the others cannot be procured. This strip of cloth being dried and suspended as above, is to be balanced by a straw, or light strips of wood fastened to the opposite end and extending out as a pointer. This is all the apparatus required, and it will infallibly indicate, with considerable sensitiveness, any change in the condition of the moisture of the room. The cloth absorbs moisture by its salted surface, and thus, becoming heavier, will carry down its end of the beam; when the air changes to a drier state, its extended surface will evaporate speedily a proportional quantity of moisture, and, becoming, lighter will ascend. Thus, at times, by a simple observation from any part of our chamber we can see the condition of its atmosphere.

The hygroscope being constructed it remains to graduate its scale. Place it near the fire until the strip of cloth feels quite dry, the end of the pointer will then stand at "extreme dryness," having marked this point, suspend the strip of cloth over the vapor of boiling water, the extremity of the pointer will then ascend, and when stationary, will rest at "extreme dampness." Half way on the scale between these extremes will be "medium," and immediately, above and below, at equal distances, will be, respectively, "dry," "very dry," and "damp," "very damp."




A is the salted cloth; B is the fulcrum—a hook suspending the light wooden beam or lever. The pointer at 3 is at "medium." According as the cloth, A, absorbs dampness, it will weigh down the back end of the pointer, and elevate its point towards 6, which is "extreme dampness" of the atmosphere. When the atmosphere is very dry, the reverse effect will be produced, and the point will sink to 0.

The instrument that I use has lately been arranged somewhat differently from that above described, merely to improve its appearance. Instead of making use of one arm of the scale-beam as a pointer, a wire has been fastened to the axis or pivot, which passes through the front of a thin box, and being bent parallel to the face, there acts like the hand of a watch pointing to its graduated scale.

Hygroscopes, on this plan, may be made quite small—not larger than a pocket watch, and equally as portable. The scale beam can have a substitute in a light strip of wood, with a needle passed through it for an axis, though it will lose somewhat of its sensitiveness by the change. If the hygroscope be suspended in the open air in connection with a barometer, the two together will seldom fail to indicate approaching weather, fair or foul.

FRANKLIN.

New York, Jan., 1831.

### Errors.

MR. EDITOR.—In reply to questions, on the 50th page of Vol. 6, Scientific American, it is stated, "we will answer our correspondent:—calomel is not composed of 1 atom of chlorine and 1 atom of mercury; it is composed of Hg. 2, Cl., (2 of mercury and 1 of chlorine); corrosive sublimate is composed of 1 mercury, 1 chlorine," &c. Authors of various works on chemistry, or chymistry, *disagree* with the editor in regard to the component or equivalent parts of calomel and corrosive sublimate.—Query:—Is the editor mistaken therein?

MERCHANT KELLY.

Bentonville, Ind., Jan. 7, 1851.

[An editor is required to be a man of patience, and slow of anger. The above from friend Kelly is an insinuation in words, but nothing of that kind, we believe, was intended. Those "authors of various works on chemistry, who disagree with the editor," should have been quoted. Who are they? "Corrosive sublimate," says Solly, "is a bichloride of mercury—Hg. Cl." The American Encyclopedia of Chemistry gives the same equivalents of compound—Hg. Cl., page 787.

### The Application of Iron to Railway Structures.

A Commission was appointed last year by the British Government, to inquire into the application of iron to railway structures. It was composed of Lord Wrottesley, Profs. Willis and Hodgkinson, Capt. James, George Rennie, C. E., Wm. Cubit, C. E,, and Lieut. Galton. The following is the substance of their Report:—

"At starting, the commission endeavored to make themselves acquainted with all the experiments which had been already made on iron by engineers; and on this point they state:

'From the information supplied to us, it appears that the proportions and forms at present employed for iron structures have been generally derived from numerous and careful experiments, made by subjecting bars of wrought or cast iron of different forms to the action of weights, and thence determining by theory and calculation such principles and rules as would enable these results to be extended and applied to such larger structures and loads as are required in practice. But the experiments were made by dead pressure, and only apply, therefore, to the action of weights at rest. As it soon appeared, in the course of inquiry, that the effects of heavy bodies moving with great velocity upon structures, had never been made the subject of direct scientific investigation, and as it also appeared that in the opinion of practical and scientific engineers such an enquiry was highly desirable, our attention was early directed to the devising of experiments for the purpose of elucidating this matter.'

As all railway structures are necessarily exposed to 'concussions, vibrations, torsions, and momentary pressures of enormous magnitude produced by the rapid and repeated passage of heavy trains,' it became a question of the extremest importance to ascertain if any and what amount of change was produced in iron under these influences. It must be remembered that although the injurious action may be in each case exceedingly small, and unworthy of particular notice, it is from the nature of the material, probable that such derangement has a certain degree of permanence, and that by multiplying the causes a dangerous, and perhaps fatal, result may ensue. We should not be satisfied that the iron bridges spanning our numerous rivers, roads, and valleys; or the tubes which cross the Menai Straits and continue the Holyhead line at Conway, are secure for a few years to come. We should determine the amount of injury if any, which is produced by the passage of every train, and to secure those structures that they may be maintained in perfect safety, with ordinary attention, for any period of time. To ascertain the effects of moving weights, a well devised apparatus was constructed in Portsmouth Dockyard, and a very extensive series of experiments made by Capt. James and Lieut. Galton. The results which they obtained were equally new and important, developing for the first time the fact that a given weight passing rapidly along a bar produces a greater deflection in that bar during its passage than it would have done had it been suspended at rest from the centre of the bar.' That is to say, a much less load will break an iron bar when moving rapidly along it, than will fracture it in a state of rest. In the report we are informed:

'Thus, for example, when the carriage loaded to 1,120 pounds was placed at rest upon a pair of cast iron bars, nine feet long, four inches broad, and one and a half inch deep, it produced a deflexion of six-tenths of an inch; but when the carriage was caused to pass over the bars at the rate of ten miles an hour, the deflexion was increased to eight-tenths, and went on increasing as the velocity increased, so that at thirty miles an hour the deflexion became one and a half inch; that is, more than double the statical deflection. Since the velocity so greatly increases the effect of a given load in deflecting the bars, it follows that a much less load will break the bar when it passes over it than when it is placed at rest upon it; and accordingly, in the example above selected, a weight of 1778 pounds is sufficient to produce fracture if passed over them at the rate of thirty miles an hour.'

The commissioners insist on the importance of giving to all railway structures an amount of solidity far superior to that which is found by experiment or calculation sufficient to support as a dead weight the heaviest loads that can travel on them."

This report is invaluable, because the commissioners are men of known ability, and they resorted to experiment for information. All science is the result of experiment. There can be no correct theory apart from practical experiment.

### Destruction of Monuments in Egypt.

An English gentleman, writing home recently, from near Thebes, in Egypt, where there is a steam engine erected for irrigation on the banks of the Nile, is justly indignant at the sacrilegious hands which have, within a few years, desecrated some of the finest monuments in that land, famous above all others in the face of the earth for its imperishable monuments of an antique age. He states that the son of Ibrahim Pacha has no veneration for the relics of the past, and he plunders the finest temples for the basest purposes, without the least regard to decency. Sculptured and painted blocks from the temple of Karnac, the finest in Egypt, have recently been dragged away to build a sugar factory. If these acts of the barbarian Turks are to be deprecated, how much more are the sacrilegious spoliations of European learned dilettanti to be condemned. Great, indeed, has been the liberty assumed by this class of men to whatever country they may happen to belong, or whatever country they may happen to get access to. They seem to hold of antiquities what the poacher does of game. There are certain monuments, in the discovery of which much money has been expended by all individuals and nations, which, in a certain sense, become vested in those parties so far as the preservation of them is concerned. Every man should respect the labors of a Salt, a Belzoni, a Hay, a Vyse, a Wilkinson; and what gratitude should be felt to such men by a follower of Champollion, who has devoted his life to the investigation of their labors, and visited Egypt for this purpose thrice. The King of Prussia has sent an agent, a Prof. Lepsius, of Berlin, three times to Egypt, a man who scrupled not to take away from Thebes three boat loads of plunder. He has left the evidence of his destructiveness on tomb after tomb, which, carefully described by Wilkinson as containing beautiful series of paintings, now present only incomprehensible fragments.

Belzoni's tomb, the richest in all Egypt, in illustration of the religion and ceremonies of the Egyptians, as well as their astronomy, besides having hundreds of square yards full of hieroglyphics and royal names, and being painted with brilliant colors and deeply cut names, has been sadly disfigured by this learned plunderer. Throughout all Egypt, the finest monuments bear the chisel and hammer marks of this learned desecrator. This destruction of those monuments is the more to be condemned, because wax or plaster of paris moulds of the characters could have been taken much easier, and for all antiquarian objects, answered a much better purpose. Every nation must feel indignant at such wholesale desecration of Egyptian monuments.

All the steel pens made in England are produced in Birmingham, though the names of dealers in other places are stamped upon them. French and some American dealers also have their pens made there with marks suited to heir respective markets.

A favorite violin, Straduartus, belonging to the late Duke of Cambridge, has been sold for five hundred and seventy-seven dollars; and another by the same maker for seven hundred dollars.

The steamship Asia arrived at this port on last Friday evening. She made the last passage to Liverpool in 10 days and 4 hours. From the time she left New York until she returned, only one month elapsed. This is quick work.

# New Inventions.

### Improved Brick Machine.

Mr. Richard Long, of Columbus, Ohio, has invented and taken measures to secure a patent for an improvement on machines for making bricks, which enables him to make about 12,000 in one day, of the very best quality of brick. His moulds are of the form used by hand labor, and they are placed on a frame and taken away as by the old hand plan. The moulds are taken in under the box that feeds in the clay, and carried back when they are full, by the reciprocating motion of rack and pinion. The feeding motion is a screw vaned pug mill, but the holes to feed the clay to the moulds, are so made that the moulds are packed, commencing at the middle and spreading towards the ends and sides, so as not to wipe away the sand from any part of the inside of the moulds. This allows the moulded bricks to be easily dropped out of the moulds. The moulds are stationary, while they are being packed with the clay, but when filled are set free, and travel outwards to be taken away, and a new set put in for the next operation. The rotary and other brick machines are complained of as pressing the brick unequally in the moulds, thus making very inferior bricks. This machine obviates that difficulty.

### New Coal Breaker.

We learn by the Minersville (Pa.) Bulletin, and the Pottsville Miners' Journal, that Mr. Wm. De Haven, of Minersville, has invented a new Coal Breaker. It is thus described in our contemporaries :—

"The machine consists of two rollers or cylinders of cast iron, furnished with splitters, set at regular intervals, which revolve opposite to a cast iron front plate. This plate is also furnished with splitters or teeth, and is perforated at regular intervals so as to admit the small coal to pass through into the screens, and thus avoid the loss by waste and dirt, which would necessarily result if there was no outlet or escape except at the schute or bottom or hopper, after passing between the plate and both rollers. The front plate is set at an angle of about forty degrees, being about seven inches distance on the top from the first roller, and about one inch from the lower roller—the teeth of the lower roller working between the teeth of the stationary front plate. The teeth or splitters are cast loose, so as to be replaced with facility and cheapness, in case of loss or breakage."

### Improved Burning Fluid Can.

Mr. John Case, of Philadelphia, has invented and taken measures to secure a patent for an improvement in cans for containing burning fluid, such as camphene, phosgene, &c., to prevent explosions of the cans by ignition. The object is to prevent atmospheric air entering into the interior of the can; and also a plan for breaking the continued connexion between the inside and outside. There are two spouts—the one delivering the fluid to a small outside chamber, in which is the spout descending to the lower end of the said small chamber, to deliver the fluid to the lamp. Owing to the way this is made, the inner end of the outside spout is surrounded with the fluid, while the delivering end of the tube, coming from the inside of the can, is not, but is separated from the outside air by the fluid in the bottom of the small chamber into which the outside dips. This, it is alleged, will prevent explosions in this fluid can.

### Improvement for Bending Carriage Springs.

Mr. James Watson, of this city, has invented and taken measures to secure a patent for an improvement in presses for setting eliptical carriage springs. The way to set the spring is to bend one half of the spring first, then turn back the feed roller by reversing its motion, and set the other half of the spring.

The improvement of Mr. Watson is in the gearing for reversing the motion, whereby one half the time is economized in setting a spring and with fewer attendants to the machine.

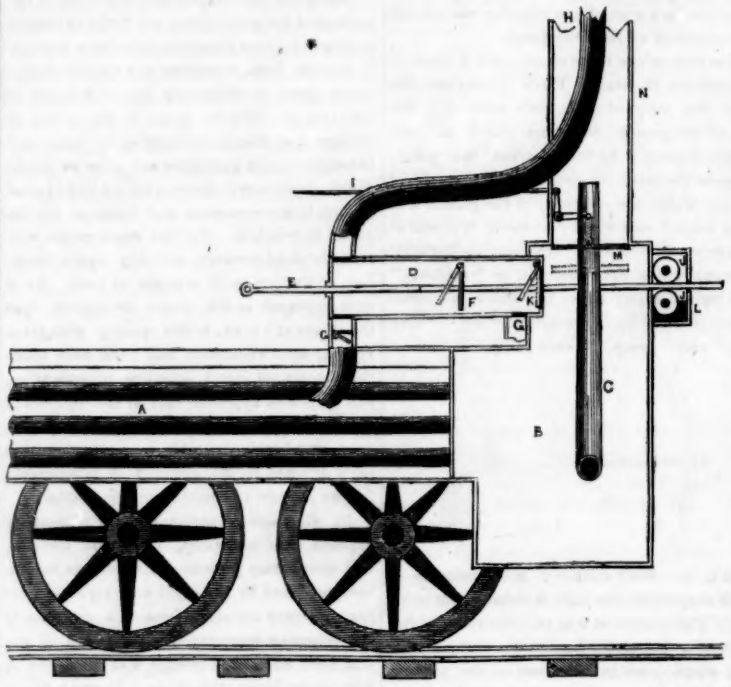
Thomas Birch, the eminent Philadelphia painter, died in that city last week at a good old age. He was 72 years old.

### Railroad Alarm Bell.

An apparatus has been invented by Mr. A. Smith, of Batavia, N. Y., for ringing an alarm bell upon railroads. The contrivance consists in simply placing a spring on the track of the road, so that the car wheels may pass over and press it, and thereby pull a wire connected with the spring and with the bell intended to be rung. The wire may be extended on poles to any distance from the point of alarm, whether it be a station, a curve, or a crossing of the road. It has been examined by railway agents, who are much pleased with its operation, and one of the machines is to be placed at once, it is stated, upon the Rochester and Buffalo Railway.

A station indicator nearly of the same nature, is described and illustrated on page 1, Vol. 4, Sci. Am.

## DENNISTON'S ARTIFICIAL DRAUGHT PRODUCER AND SPARK ARRESTER.

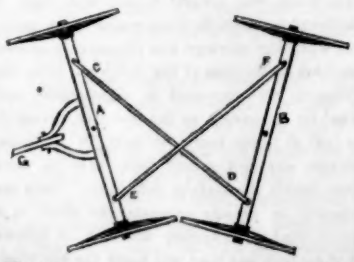



The accompanying engraving represents an invention of Mr. John T. Denniston, of Lyons, Wayne Co., N. Y., who has taken measures to secure a patent. The invention is represented in a longitudinal vertical section as applied to a locomotive. A is the body of the boiler, with the usual tubes running through it. The principle of the invention is to draw the smoke out by mechanical pumping, and not use the exhaust steam to produce the draught. B is the usual smoke-box; C is the steam exhaust pipe, to conduct the steam up through the chimney, N. A cylinder, D, is placed upon each side of the boiler, (one is only shown), with its back end projecting into the smoke-box, B. On the back end of the cylinder is a valve, K; and there is a piston, F, with a valve in it like that of a lifting pump. E is a connecting rod, which is attached to the valve piston, being forked, and passing through the back end of the cylinder, and between the two anti-friction rollers, J J, in the chamber, L. These rollers run in a supply of grease or oil. The rod, E, of the valve piston, F, may be connected to the engine in any way to give it a reciprocating motion backwards and forwards. There is no connection between the smoke-pipe, N, and the smoke-box, B, except when kindling up. There is a lever, I, connected by a bell crank to the damper plate, M, which, when it is pushed back, the plate, M, is set as shown at the dotted lines, to let the smoke pass up; but when the engine is in motion, the smoke all passes through the cylinders. This is done as follows :—the plate, M, being in its seat, and the piston rod (after the back stroke) being drawn forward, the valve, K, opens, and the smoke rushes into the cylinder; and then when the motion of the piston is reversed (pushed back), the valve of the piston, F, as shown by the dotted lines, opens, the valve, K, closes, and the smoke rushes up through the pipe, H, out of the chimney. There being two cylinders, D—the rods of which are set at right angles—while there is an intermission of smoke action in the one, the smoke is rushing up the pipe, H, in the other, thus keeping up the current. The cessation of smoke action causes the sparks to fall, and as the piston, F, is not required to fit exactly tight to the cylinder; the sparks and light particles of fuel are deposited in the pipes, G G, which have valves opening downwards, so as to let sparks out, but allow no back draught upwards. This is to obviate the use of spark arresters. This draught being deemed sufficient for any amount required, —the force of the exhaust steam is not only unnecessary, but is a detriment to the spark catcher; it is, therefore, proposed first to enlarge the exhaust openings; and, secondly, to expand the steam down to the lowest point, thereby getting rid of most of the back pressure.

More information may be obtained by letter addressed to Mr. Denniston.

### Helton's Improvements on Carriages.

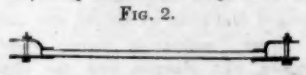
Fig. 1.




This improvement is the invention of Mr. Michael W. Helton, of Bloomington, Indiana, who has it in practical operation, and finds it to work admirably. Figure 1 represents the improved carriage coupling, with the axles and wheels. The two axles, A and B, are coupled together by two rigid coupling bars, C D and E F, which run diagonally from the axle A to axle B; and each coupling bar is connected to each axle by means of a joint or hinge. The body of the carriage is supported by centre bolts or fifth wheels resting on the middle point of both axles. The coupling bar is shown in figure 2.

The advantages claimed by this invention are, first, simplicity and cheapness of con-

Fig. 2.



struction, comprising, at the same time, strength and durability, the diagonal bars serving as braces for the axles of the carriage. Second, that it avoids the necessity of small fore-wheels, because the hind wheels will come into the body, in turning, at the same time that the fore wheels will, they being the same size. The large fore wheels will give much lighter draught to the carriage. Third, that it turns in less space than in the old arrangement, because the hind part turns at the same angle that the fore part does. Fourth, that in turning, the hind wheels follow in the track of the fore wheels. It can be seen from this, that if the axles be produced they will meet at a point which may be the centre of a circle, the two axles part of the radii, and the track of the wheels the circle described.

More information may be obtained by letter addressed to Mr. Helton.

### New Method of Engraving.

At a recent meeting of the Sheffield Literary and Philosophical Society, says the Sheffield (Eng.) Times, Dr. Branson read a paper describing this process. His mode of operation is to place a frond of fern, algæ, or similar flat vegetable form, on a thick piece of glass or polished marble; then taking and softening a piece of gutta percha, of proper size, and placing on the leaf and pressing it carefully down, it will receive a sharp and accurate impression from the plant. The gutta percha retained level, and allowed to harden by cooling, is then handed to a brass caster, who reproduces it in metal from his moulding vase. This, it will be obvious, is the most delicate and difficult part of the process, and one which, a few years ago, would not, we suspect, have been executed in Sheffield. As it is, Dr. Branson has had many brass plates thus produced from sand-castings, which only required a little surface-dressing to yield, at once, under the copper-plate printing press, most beautiful as well as faithful impressions of the original leaves; indeed, many of the exhibited specimens of ferns, printed in green color, and slightly embossed, as they must needs be by the printing, were such perfect fac-similes of the natural pattern, that they might easily be taken for it. Besides these matters the doctor exhibited a large variety of patterns of embossed leather, which had been produced by a somewhat analogous operation. As, however, this latter invention is not so much for copying designs as for creating them, and, at the same time, saving all the expense of die-cutting, the following is the course pursued :—The operator takes a piece of common hard white soap of the required size and surface, and upon that executes any design, whether of the depth and boldness of ordinary embossing, or in the delicate lines of an etching; in either case the work is executed with the greatest ease. From this soap-model or engraving an impression is taken in gutta percha; from that a secondary one, which, on being cast in brass, as before, may be used for printing or embossing in the ordinary way. The reader stated that his main difficulty was in getting the last gutta percha coat to separate from the mould of the same substance into which it was pressed. He had found, however, that by powdering both the surfaces with common bronze dust, before taking the impression, they did not adhere.

### Syphons to Raise Water over Banks.

Mr. O. P. Laird, a farmer at Oneida Castle, N. Y., writing to the Genesee Farmer, states that he has a syphon in successful operation which conveys water to his house, a distance of sixty-six rods, over a ridge of land sixteen feet high, in half inch lead pipe, No. 1. It is discharged four feet lower than the surface of the water in the spring, and at the rate of eighteen gallons per hour.

Syphons will continue to work, provided they are perfectly tight, and if there is a moderate amount of fall from the surface of the water in the well to the place of delivery. Water is raised in a syphon on the same principle that it is in the suction pump, and may be elevated to the same height, to wit, thirty-two feet. The objection to raising it very high in a syphon is that air separates from water when thus raised, and the higher it is drawn the more. It is essential that there should be sufficient current to carry out this air as fast as it is evolved, otherwise it would accumulate and stop the water. Four feet of fall answers the purpose. Everything depends on the perfect air tightness of the pipe.

# Scientific American

NEW YORK, JANUARY 25, 1851.


### Daguerreotype.--New Discovery.

We like pictures, and find a partial delight in looking upon the most common-place production, if it has the least redeeming touch of nature; and when we see a great work, words cannot convey the pleasure it gives us to look upon it. We always look in at the picture windows in Broadway, and never fail to look at the cases of our daguerrian artists. Being deeply impressed with the merits of some miniatures, at the entrance of the National Gallery at the corner of Broadway and Murray streets belonging to Mr. Gavitt, the superb daguerrotype artist, we went up stairs for a short period to visit his fine gallery of portraits, and were well paid for a visit. There is not a single great man in our country without his likeness there, and there are 170 pictures of distinguished Americans now no more, but who were living within the past six years. There was a likeness of the heroic Jackson, taken by an artist three days before the veteran died; Audibon, Sir John Herschel, and many other men of note. All our great military and naval characters are to be seen there, if not as large yet as natural as life. This gallery is well worth a visit, and it is something of a privilege to have such artists in our country. America bears a high character for skill in this art, and the business is quite extensive in New York, which is the head quarters. There are 71 rooms in our city, and 127 operators, and thousands upon thousands of pictures are taken every year. The art has wonderfully improved since it was introduced, and it is improving every day. Although almost every person knows that there is such an art, and although hundreds of thousands have had their likenesses taken, yet there are not many who know the true theory of the process. Let us describe its nature. A plate of copper silvered on one side and brilliantly polished, is iodized with the iodide of silver. This is done with great care by the artist, and it is best to prepare the plate just before the operation is performed. This plate is put into the camera obscura and is then exposed to the lenticular image of the person whose portrait is to be taken, for about 25 or 30 seconds. If allowed to remain a sufficient length of time in the instrument, a picture would be taken on the plate, but the plate is not allowed to assume this condition, but is taken out before the eye can detect the change on the plate, and it is then exposed to the vapor of mercury, which is condensed upon the plate in exact proportion to the amount of chemical action on the plate when in the camera obscura. After this the likeness is set (fixed,) by the chloride of gold; if the latter operation were not performed the picture would soon disappear. The whole action is chemical, and the actor is light—the pencil of the sun. Colors which reflect light show light on the picture. Black absorbs light, and is the best dress to contrast with the light parts of the picture.

The preparation of the plate, the position of the person, the regulation of the amount of light, the color of the room, the management of the camera, require practice, taste, and what we would call *knack*, and a great amount of patience. There is just as much difference between daguerrian artists as there is between painters, and this is not a little.

New Discovery in Daguerreotype.—At a recent meeting of the Paris Academy of Sciences, M. Regnault read a communication in which it was stated that a skillful artist, named M. Laucherer, of Munich, whitens the sides of his camera obscura, in order to obtain greater sensibility of expression. M. Blanquart Evard, of Paris, has made a number of experiments, in which he has ascertained, contrary to what has been the opinions heretofore on the subject, that the black coating inside of all the cameras now used, to prevent the reflection of light, lessens the photogenic action on the prepared plate or paper. He has, therefore lined the sides of his camera with white paper, and given the interior of his tube a white coat, at the extremities of which are the two object glasses. With the above alterations in his instrument, he has experimented on the silver plate, albumenized glass, and on paper, and he states that the image forms in one half the time required in the blackened camera, that it is formed by light insufficient to give an image in the usual camera, that the action is more uniform—the light parts not disappearing before the shaded parts are fully impressed—and there is far less resistance to photogenic action in red, yellow, and green colors. We hope that some of our artists will try this alteration in their instruments, and give us the results.

### Falling of Buildings in New York.

It is disgraceful to the city of New York, that so many murders have been committed in it by the falling of the walls of buildings. Yes, it is more than disgraceful, it is criminal, for the investigations instituted in all cases, have disclosed the most criminal recklessness in the erection of the buildings, which have been the causes of such catastrophies. In May, 1850, we called attention to the causes of the falling of walls in our city, and presented diagrams of the *bonds* which should be used for brick edifices. We stated that bad mortar, the erection of walls in frosty weather, and bad mason work, were the principal causes of the falling of walls. The articles we published on the subject, will be found on pages 277 and 285, of Vol. 5, Sci. Am. Although we have said much on this subject, it does not appear to have done any good. On Wednesday afternoon, last week, six buildings in the course of erection in Twenty-first street, fell with a sudden crash, killing 5 men and injuring, more or less seriously, 19 others. The builder is Mr. George Spencer; the architect is a Mr. Wm. Thomas.

The Coroner's inquest has revealed the most culpable recklessness in those who had charge of the erection of the buildings. The mortar was wretched, being no better than dirt from the streets; the walls were built in frosty weather, and the foundations were bad. The timbers were too light, and the walls were not plumb. The width of the foundation, which should have been 18 inches, was only 14 inches. Twelve courses of brick were laid up without a *header*, whereas it is the common rule to run up only five *stretchers* and then a row of headers. One man, named Richard Edwards, a mason, cautioned them about the walls, when he was told that "there were plenty of houses in New York put up as badly, and still stood." The men employed to lay the brick were poor workmen. None of the men on the party wall, but one, could carry up a chimney.

The most ugly and disgraceful feature in the whole case is this, the architect gave a certificate that the walls were sound and the work well done, about two hours before the buildings fell. And yet what will be the result? Will this lead to the erection of better buildings for the future? Will the men who have been the chief causes of the deaths of five fellow beings be sent, as they should be, to the State Prison? No such thing! Cheap buildings are wanted, and money to be made out of them, and there is so much corruption abroad, that nothing can be expected to result from this investigation but a continuance of the same cold recklessness of all moral obligations. What has resulted from the terrible Hague street explosion, after all the inquest and severe verdict of the coroner's jury. Do not the guilty stalk about with uplifted heads? and do not the legal prosecuting officers in our city walk about as calmly as if they, like Pilate, had merely washed their hands to free them from moral guilt? We would fain hope that every culpable person connected with this affair, would receive prompt and severe punishment as a terror to all such evil doers, and the number is not small in this city.

The cheap postage bill has passed the house of representatives. Letters are to be carried for three cents, and coins of that denomination made of an amalgam of copper and silver, will soon be issued. Papers are to be sent free of postage within 30 miles of publication offices. We hope the Senate will pass the bill.

### The Crystal Palace for the Great Exhibition.

This palace is nearly completed according to the terms of contract, and Prof. Cowper recently gave a very fine description of it to the Members of the Royal Society of Arts. The contractors, Messrs. Fox and Henderson, have done wonders. He stated that these gentlemen were the only firm that made a tender, and in entering into the contract they reserved a large discretionary power as to the mode of carrying it out. The building which they had constructed was not an architectural edifice in the strict sense of the word. It was not built of wood, or stone, or brick, but of iron—a material which, he maintained, had hitherto been ignored by architects; and he mentioned as an illustration of this, that the hall of King's College had its roof supported by iron pillars, which were encased in wood, so as to impress one with the idea that the columns had a greater diameter than in reality was the case. Architects building up edifices stone by stone, and attending chiefly to beauty of design, were not under the necessity of making minute calculations; but the mechanical engineer must calculate step by step, and therefore there was not a point in the edifice where they were assembled which had not beforehand been submitted to the most rigid calculation. What had been the result? There were no broad surfaces—no columns seven feet in diameter, as at the British Museum, supporting nothing at all but a succession of straight lines. People looked and said, "What a slight building!" the building was a light one, it is true; but the difference lay between the words slight and light, and the letter "s" ought to have been omitted. As an illustration of the strength of hollow columns, the learned Professor showed that two pieces of quill, 1 inch in height, would support a weight of nearly 2 cwt. He also announced and explained the proposition that a given quantity of matter disposed in the shape of a tube pillar would bear a pressure nearly four times as great as the same quantity in the form of a solid column. Passing to the manner in which the columns were fixed, he described the mode in which the beds of concrete on which they rested were made; and then adverting to the fact, that all the dimensions were multiples of 24, he drew attention to the effect of this arrangement—that, whichever way the spectator looked the columns covered each other, and all appearance of confusion was entirely destroyed. Had these relative distances not been accurately preserved, the girders, cast as they were at a distance, would not have fitted. The cast-iron columns being mounted on each other, tier above tier, with centre-bits intervening between them, it was necessary that the points of junction should be fitted to each other with mathematical precision. This necessity Professor Cowper illustrated by pieces of wood, roughly cut in pillar shape, and placed above each other, which, of course, would not stand straight, the same experiment being repeated with pieces of wood pillar shaped, and the ends turned in a lathe, of course with a very different result. Thus, he continued, it became requisite that the ends of the pillars should be turned. There were 2,500 columns and 1,200 "facings" to be done. Few engineers would have ventured on such an undertaking, but Messrs. Fox and Henderson had accomplished it, and the result was, that there was not a crooked line in the building. Professor Cowper then adverted to the girders, and proceeded to show how, in technical language, they "behaved." As an illustration on this subject he demonstrated by experiment that thin tin plates in a tubular form could bear a pressure of 2 cwt., whereas in a flat form they gave way at once. He explained by models the object of the girder, and showed that, with its trelliced form, every part of it was designed to distribute the strain which would otherwise have fallen unduly upon particular points. One of these models was executed in thin lath, yet it bore a pressure of 1 cwt. without breaking. The subject of girders naturally led the learned Professor to consider the amount of "stiffness" secured to the building. Here his illustrations were again in lath, and were admired for their great simplicity and ingenuity. He then proceeded to explain the method of proving the girders by the hydraulic press, and he stated that while they generally broke with the weight of 30 tons, and were tested by one of 15 tons, the greatest pressure to which they could be subjected in the building was 7½ tons. Adverting to the means by which the edifice had been erected, and the common remark that there was no scaffolding, and nothing to be seen but a few poles, pulleys, and ropes, the Professor commented on the striking simplicity of design in an edifice which in its progress itself supplied nearly all the scaffolding required for it. This building is the most wonderful in the world. Huge trees are covered within its walls, as they were not allowed to be cut down, because the popular feeling of the people said "woodman spare that tree."

### Design to Convert the Patent Office from its Legitimate Use.

Extraordinary efforts are now being made to get Congress to deprive American inventors of the east side of their new Patent Office Building, in order to convert it into offices for the use of several departments of the government which have been created since the Patent Office was commenced; in other words, the departments under the control of the new office called the "Secretary of the Interior;" the gentleman who considers himself the head of the Patent Office. The present Secretary of the interior with the aid of the Commissioner of Patents, is seeking to divert the Patent Office from its legitimate and original purpose, and have reported and recommended to Congress, "that the two wings of the Patent Office be finished and appropriated to the accommodation of the department of the Interior." Inventors will take it to be the unkindest cut of all, thus to be wounded by their friends. We will publish more upon this subject next week, and will illustrate our subject with diagrams of the Patent Office. In the meantime, we hope that no hasty action will be taken in the matter by Congress.

### To Mechanics.

By reference to our advertising columns, it will be seen that a very excellent situation, with a yearly salary nearly as much as what some of our State Governors get, is offered to a man qualified to fill it. He must be able to perform all the duties required, and he must have an unexceptionable character. We know that it is not easy to get such men, but there may be some one qualified, whose attention may be arrested by this notice. How many of our Mechanics, if they were wise, might be able to fill such situations. A few years ago we could have got a first rate situation for a millwright to go to South America, but could not get one with the requisite qualifications. The few good men we have are never suffered to look at their fingers long.

The firm advertising in our columns is exceedingly respectable, and a good man qualified to comply with the terms, would find the situation to be a good one.

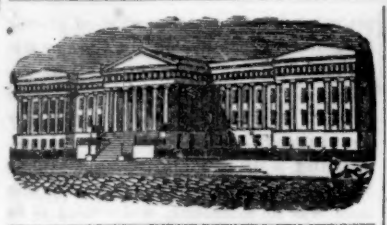
### New Fuel.

A locomotive engine is being built at a shop near this city, in which nothing but alcohol is to be used for heating the boiler. It is constructed upon a principle heretofore untried, but it is expected to be entirely successful in its operation. It is built, it is said, for the Erie Railroad, and it will be tested on that road next week, when it will prove a failure.

### Gutta Percha for Covering Telegraph Wires.

The London Gutta Percha Company has addressed a letter to the London Mechanics' Magazine about the Report of the American Patent Office in relation to covering telegraph wires with gutta percha. It states that the imperfect manufacture of the material in America, is probably the cause of failure as mentioned in the Patent Office Report. Wire covered with gutta percha, has been laid in the German Ocean for more than a year. Forty miles of gutta percha covered wire has been laid down on the London and North-Western Railway; fifteen miles of it has been laid under ground.

The mode of covering the wires may be the cause of its failure, but respecting this part of the operation we are not entirely acquainted.



☞ Reported expressly for the Scientific American, from the Patent Office Records. Patentees will find it for their interest to have their inventions illustrated in the Scientific American, as it has by far a larger circulation than any other journal of its class in America, and is the only source to which the public are accustomed to refer for the latest improvements. No charge is made except for the execution of the engravings, which belong to the patentee after publication.

### LIST OF PATENT CLAIMS
**Issued from the United States Patent Office.**

FOR THE WEEK ENDING JANUARY 15, 1851.

To T. Abbot, of Manchester, N. H., for improvement in Tires for Railroad Car Wheels.

I claim making the tire of car wheels by the combination of several distinct pieces, so arranged and disposed as mutually to support and confine each other, substantially in the manner above described.

To John L. Allen, of New Haven, Conn., for improvement in raising carriage-tops.

I claim the application of a spiral spring to operate upon the braces of a carriage top, so as to assist in supporting and elevating the top, substantially as described and shown.

To Erastus B. Bigelow, of Clinton, Mass., for improvement in Looms for weaving piled fabrics.

I claim connecting the intersecting bars or plates, with the loom, substantially as described, so that they shall be free to vibrate and yield to the beat of the lathe and shedding of the warps, as described.

And I also claim combining within the said vibrating bars or plates, a stop or stops, to arrest them at the required point, substantially as described, that the continued beat of the lathe may cause the fabric to move forward over them, as described.

[Mr. Bigelow appears to be fertile in inventions: no other man has secured so many patents within the last three years.]

To A. M. Billings, of Claremont, N. H., for improvements in connecting and disconnecting hubs and axles.

I claim the device for detaching a wheel from its axletree, by means of the plate acting as a wrench for unscrewing the nut which holds the wheel to the axle, said plate being advanced and withdrawn by a screw, substantially as described.

To Joseph Dorwart, of Morgantown, Pa., for improvement in Tuyeres.

I claim the curved partition in the air chamber, placed opposite the orifice of the wind-pipe, with its lower edge extending beneath this orifice, the arrangement and construction of the partition being such that it serves the double purpose of directing the blast upwards, and facilitating the descent of the cinders, as herein set forth.

To J. S. Gwynne, of New York, N. Y., for improvement in Rotary Pumps.

I do not claim to be the inventor of the centrifugal pump, nor simply using collars, extending from the openings in the outer case to the openings in the piston case, to prevent the water, or air, from passing between said cases; nor extending the inlet suction pipe inwards, in such a manner as to supply the place of one of said collars, this having already been done—but I only claim thus extending said pipe, when the collar on the opposite side is made adjustable, and the parts so arranged, that the joints of the piston case, with said pipe and collar, may be tightened as they wear by tightening the adjustable collar only, as described. The piston case and the suction pipe being constructed, substantially as herein described.

To Joseph Harris, Jr., of Boston, Mass., for improvement in changing a reciprocating into a rotary motion.

I claim the application to steam or other engines or machines, of a mechanical arrangement, whereby the effect of the applied power is rendered equal, or nearly so, both on the outward and return strokes of any reciprocating or vibrating movement, using for that purpose, the aforesaid combination of the cranks, connecting rods, and oscillating lever, or their equivalents, as described in the above specification, and shown in the accompanying drawings.

To G. R. McFarlane, of Hollidaysburg, Pa., for improvement in Cast Iron Car Wheels.

I claim the mode of constructing a cast iron car wheel, by the use of spokes, or arms, composed, in part, of portions of a hollow cone connected by brackets; and in part by straight spokes, or arms, forming a continuation of plates and spokes, possessing the advantages and obviating the objection of both.

To Hugh & James Sangster, of Buffalo, N. Y., for improvement in Reflectors for Street Lamps.

We claim making the faces of the Reflector in concave rings, substantially in the manner and for the purposes herein set forth.

To J. E. Andrews, of Boston, Mass., for improved Steering Apparatus.

I claim the combination of the cranks and the connecting rods, which are attached by universal joints to the projections, or arms, in the rudder post, the cranks having a worm wheel on their shaft or axis, which gears with and is actuated by an endless screw on the axle or shaft, of the steering wheel; the whole of the parts being arranged in the manner substantially as described.

To John Jones, of Clyde, N. Y., for improvement in Carriages.

I claim the bars, or reaches, placed in connection with the straight reach, as above described, and in combination with the spring rod and cross-bar, substantially in the manner described.

To S. C. Blodget, of Georgetown, Mass., & John A. Lerow, of Boston, Mass., for improvement in Sewing Machines.

What we claim is arranging the shuttle which carries the filling thread, so that it shall revolve horizontally in a circular race, said shuttle being constructed with a curved front and pointed nose which shall travel in a circular guiding groove, sunk below the bottom of said race, so that the shuttle shall inwardly pass through the loop formed in the needle thread, all as herein above set forth.

We also claim the pad or washer under the spring arms, which carry the shuttle for keeping the filling thread straight, as before explained.

Furthermore, we claim the combination of the wide spring, and the bent lever spring, operating as herein above described, or any contrivance substantially equivalent thereto, for relaxing the needle thread when the loop is to be formed, and holding it rigidly, when each stitch is to be tightened, as herein set forth.

We also claim the converging nipper springs, through which the needle, &c., passes, to keep the thread up and prevent the needle from splitting or breaking it, as set forth.

We also claim the combination and arrangement of the spring arms (four) with the cam ledge, or any other means essentially the same, for the purpose of disconnecting, alternately, said arms from the shuttle, for the purpose of allowing the shuttle to pass through the loop, as described.

### The Northern Lights.

The investigations in this country and Europe into the nature and causes of the Aurora Borealis, are educing certain facts, that are found amenable to certain laws, which may finally lead to the solution of this astronomical puzzle. The Royal Society of Edinburgh, in 1850, ascertained that the auroral appearances quite faithfully correspond to the diurnal and annual variations or disturbances of the magnetic needle. They are most at 9 o'clock, increasing towards and diminishing from that hour of the night. They are also greatest at the equinoxes, and least at the solstices, and particularly at the summer solstice. They have also a monthly variation of frequency or intensity, which depends obviously on the age of the moon, being the greatest when the moon is about at the end of her first and third quarters. The results of these investigations are interesting.

A number of rioters on the railroad near Pittsburgh, have been taken prisoners by the Sheriff. They should be sent to the State Prison.

For the Scientific American.

### Mechanical Principles.--No. 4.

THE LABORING DUTY OF MACHINES.—My object in writing a few articles on the Principles of Mechanics, was to show clearly, but in as few words as possible, the nature of cause and effect in mechanics, for the benefit of many, who have no clear views of what the cause of motion in bodies is, and who, therefore do not know the nature of the effects produced, many supposing that an effect can be greater than a cause; or, in other words, that a machine can be made to give out more power than that it receives—these are the perpetual-motion enthusiasts. For full treatises on the principles of mechanics, I would refer young men to Lardiner's Mechanics, as a simple and clear work, to Newton's Principia, and to Renwick's work; these enter deeply into the subject.

In my last article I stated that action and re-action were equal, in other words, that the power of a machine was its weight multiplied into its velocity; and the power of a steam engine was its steam pressure on the piston and the velocity of the piston.

How to measure the force of a body in motion was long a disputed point among mathematicians, and so keenly and long was the dispute continued between Newton and Leibnitz, that it brought no little discredit upon the science of mathematics, which has always boasted of "a degree of evidence inconsistent with debate." The one class said that the way to measure force was $W \times v$, the other the product arising from $W \times v^2$. It was at last observed that neither impetus nor momentum as viewed by the old abstract philosophers, had much to do with practical mechanics, or measures properly the efficiency of ordinary machines. The criterion of their efficiency is the force multiplied by the space through which it acts, and the effect is named *duty*. James Watt introduced this term when, in ascertaining the power of his engines, he assumed, as the dynamical unit of a horse power, 33,000 lbs. raised one foot high in a minute. This definition is founded on the assumption that the resistance remaining the same, the pressure must be exerted afresh at every point through which the resistance is overcome, such as by raising a weight by block and tackle, we cannot relax our exertions for an instant, or the body will begin to descend, unless prevented from doing so by some contrivance, or hanging by our weight for an instant of relief on the end of the rope. The same amount of power required to saw through one inch of a log, is required to saw through another inch, hence the laboring force of a machine, it makes no matter what machine—is proportional to the resistance and the space conjointly, and may be measured by $(F \times s \times t)$ force, space passed through, and the time occupied in action. Laboring force is independent of the nature of the work to be done, for this may be very diversified. Much of the useful effect of force may be lost in a machine, according to the mechanism of it; hence the value of one machine as compared with another. That machine is the best which transmits the greatest per centage of the power applied to it. A steam engine may be so packed and made, that it will only be able to move while another may transmit a great amount of power by driving other machines. If a man's weight be 140 lbs., and he is capable of raising 100 lbs. by a rope over a beam, without a pulley, and with a pulley to raise 130 lbs., the pulley, in the latter case, by lessening the friction, economises the power applied. Here, then, the vast field of machinery is spread before our view; and this is a field in which the teachers of natural philosophy—the men of science in the abstract—great mathematicians and scholars, are less learned than any journeyman machinist in our country.

MACLAURIN.

N. B.—I perceive that Mr. W. A. Black, of Philadelphia, has been attempting to correct me, under my last article, No. 3. It would have been well if he had studied the matter somewhat more profoundly. This advice may apply to others. Every part of a subject should be taken up in connection, to see how it dovetails. According to Mr. Black's reasoning, a feather and a ball would fall with equal velocity. In the very article he attempts to correct, and in the preceding paragraph to the one he finds fault with the whole subject is explained. Let him read that over and he will find where *his* error lies. M.

### Seasonable Hint to Consumers of Coal.

We have frequently been pained at the ignorance which prevails in reference to the proper treatment of anthracite coals. Acting upon the principle that much fuel will secure much heat, servants are wont to fill stoves and fire-places with coal, thereby suffering the noxious gases it contains to disperse themselves in the room, instead of consuming them as it otherwise would if a red heat were generated. The room in such cases, is rendered extremely disagreeable, unwholesome, and, in many instances, dangerous. The growing prejudice against anthracite coal, for domestic purposes, is really without foundation. All the evils flowing from its use are the result of carelessness and ignorance of its peculiar properties; and it only requires proper treatment to establish its superiority over every other known fuel, whether the product of our own or foreign mines or forests. The practice of throwing too much coal in the fire and destroying the draught necessary to consume it, leaves its pernicious effects in the very food we eat, no less than the rooms we occupy. No stove should ever contain, on a fair average, a greater layer than four inches of coal, and, with but slight exceptions, that depth of layer would suffice for steamers, or any other place where a powerful heat is required.

Coal—all coals—feed on the atmosphere. You may fill a metallic vessel with coal, and, closing it compactly, place it over a red heat, it will fail to ignite—but suffer a draught to approach it, and it will give out a heat concentrated, regular, and incomparably powerful. Be careful, therefore, that you do not supply your furnaces too liberally—it is false economy at best. By its sparing use, a beautiful red heat is secured, the coal will part with all its inflammable elements, and deposit the earthy matter in fine particles in the receiver—leaving no smoke or sulphurous gases, and proving itself the most cleanly as well as economical fuel that can be used.—[New York Courier & Enquirer.

[The above advice is good, and quite in place, at this season of the year. There is a great knack in burning coal. Some firemen can keep up as much steam as others, and not consume within one fourth as much fuel. The green coal should be laid on as close to the furnace door as possible, and the red coal first pushed back from the door, every time the fire is mended. A great number of stoves are constructed apparently for the purpose of diffusing the gases through apartments. They are put together like lattice work, as if the fire required ventilation at every point of the compass. This is the case especially with a great number of cooking stoves. We do not know a single coal stove in existence, which comes up to our ideas of what a stove should be. The grates of them all, at any rate, are badly arranged. They should be so arranged and constructed, that the fire could be taken out with a shovel at any time. They should be made like furnace grates, so as to allow the ashes, clinkers, &c., to be removed by the doors.

### Liquid Leather.

Dr. Beruland, of Larria, in Germany, is said to have discovered a method of making leather out of certain refuse and waste animal substances. He has established a manufactory near Vienna; no part of the process is explained; but it is stated that the substance is at one stage in a state of fluidity, and may then be cast into boots, shoes, &c. Such a a discovery is not improbable.

### The Telegraph.

There is said to be at this time 22,000 miles of telegraph in operation in the United States; 12,000 on the Morse principle, and about 10,000 on the House and Bain principles. The telegraph now extends from Halifax to New Orleans, and as far west as Dubuque, Iowa.

### TO CORRESPONDENTS.

"B. F. G., of N. Y."—If we understand the idea of your gate fastener, our opinion is that it could be patented; the same application of the spring has not been made before, that we know of. These devices are so numerous that it is difficult to tell exactly.

"P. & D, of Geo."—We shipped the lathe on the 2nd inst., on board the New Hartford, for Savannah.

"C. C. W., of S. C."—There is certainly no difference in the draught of either the iron or wood vessels. The model and the tonnage determine that, independent of the material. Wooden vessels are the cheapest and best in America. We like the wood best.

"J. W. T., of Phila."—See pages 220 and 249, Vol. 5, Scientific American, for illustrations and descriptions of Dick's Presses. They are now made at Matteawan.

"P. B., of Mass."—The cast iron pipe would have to be ½ inch thick: this is the rule of cost for a ten inch bore. The length is 9 feet castings, with sockets for one length to be fitted and cemented into its fellow. This answers three questions; we cannot tell you the price exactly at present.

"W. C. D., of Ala."—Mr. Thos. Judd, of Cabotville, Hampden Co., Mass., is the inventor of the kind of wind wheel you describe, and for particulars you had better address a letter of inquiry to him.

"E. A. D., of N. Y.—We neither can publish your circular, nor extract as you suggest, what we said on page 231, Vol. 5, "your plan would certainly prevent explosions with a legal examiner to examine, as you state," this was our language. Now let us see the apparatus operate before we say any more about it. We took it "as you stated," not that we saw it operate.

"E. K., of Mass."—We do not know all the particulars about the process of covering the wire, but know that it is done; and we know that by heating the wire, gutta percha can be made to stick to it. A new machine, not yet made public has been invented to cover them out of sheet gutta percha. It is not in use, but we have seen the model.

"G. W. S., of N. J."—We do not think your invention will answer as a substitute for the springs. The grand object is to have the springs connected with the truck axles, so as to exert elastic pressure to keep the wheels on the track, and yet modify concussive resistance. Yours does not afford a substitute for this principle. We do not believe that the brake would come into use—self-acting brakes are strongly objected to by R. R. conductors.

"W. T., of N. Y."—We do not well know what to say to you about the fire-proof material. There are a number of kinds of fire-proof cements for sale in our paint warehouses, although we do not know any one exactly like yours. We could not tell whether it would soon be profitable to you or not. By judicious advertising it no doubt could be made to yield a good revenue in the course of time.

"L. P. S., of Conn."—We are of the opinion that your device is new and patentable; you must however be aware that the field has been well explored, and there now exist many different modifications for the purpose. You can send a model to this office for examination.

"J. S. B., of N. Y."—See Dr. Foster's communication in the Sci. Am., week-before-last: it relates to the very subject you speak of, and gives all desired information.

"R. B., of Conn."—The metal for branding wood is either iron or copper—the latter is by far the most suitable.

"G. A., of Geo."—You are right about long and short levers—the greater length, the less speed and greater power—the other the reverse. There is a gain by the angle.

"A. L., of R. I."—Is informed that the Maryland Machine Co., Ellicott's Mills. Md., can furnish excellent bone grinding machinery—for particulars address Geo. Poe, Esq., Agent, at the above place.

For want of space, several answers to correspondents have been left out this week. They will appear in our next. We mean to answer letters in regular order, when it is possible to do so.

Money received on account of Patent Office business, since Jan. 14, 1851:—

J. H. S., of Mass., $30; C. F. M., of N.Y., $44; J. W., of N. Y., $20; W. B., of Ala., $20; T. R., of N. Y., $55; S. B., of Conn., $30; C. A., of Penn., $25; J. C. A., of Conn., $30; T. R., of N. J., $63; J. S., of Mass., $10; J. M. B., of W. Y., $50, and J. C. K., of N. Y., $20.

The specifications and drawings belonging to parties of the following initials, have been forwarded to the Patent Office during the past week:—S. G., of N. H.; C. F. M., of N. Y.; J. W., of N. Y.; A. T., of N. Y.; R. W. A., of Conn., J. S., of Mass., and J. C. K., of N. Y.

### Patent Claims.

Persons desiring the claims of any invention which has been patented within fourteen years can obtain a copy by addressing a letter to this office; stating the name of the patentee, and the year the patent was granted (adding the month of the year when convenient), and enclosing one dollar as fee for copying.

# Scientific Museum.

### Adulteration of Milk.

The substances most commonly used for the purpose of adulteration appear to be water, flour, starch and finely powdered chalk.

On examining a little of the milk under the microscope, the peculiar grannules of starch and flour may be readily seen, larger and more oval than the milk globules, if either of these substances are present. Should any doubt exist as to their real nature, the addition of a drop or two of the solution of iodine will impart to the farina grannules a dark purple color.

The presence of chalk may be still more easily discovered, since, owing to specific gravity, it soon subsides to the bottom of the liquid, where it may at once be recognised by its effervescing on the addition of a little muriatic acid.

We have no chemical means of ascertaining whether water has been fraudulently added to milk, the only effect being to dilute it and render it poor in quality. A knowledge of the specific quantity cannot here be made available, since the abstraction of cream, which has a lower specific gravity than milk, may be made to neutralize the effect produced by the addition of water; the tendency of the removal of the cream being to raise the specific gravity of the fluid, and that of the addition to lower it. A specimen of milk, therefore, which has been impoverished by the abstraction of its cream, and still further weakened by the addition of water, may be made to possess the same specific gravity it had when taken pure from the cow.

### Animal Substances in the City.

Professor Hare, of Philadelphia, has sent a communication to our City Council relative to the disposal of dead animal substances in this city, without giving any of the offence which is generally the case in the removing of such matter, and converting the same into manure. Mr. Hare proposes to put the city in possession of all the knowledge which he has acquired by a number of experiments upon the subject, which have been extensive, and have led him to believe that it may be made a substitute for guano. For his compensation he is willing to take the sum paid by the inspector for the removal of the offal from the foot of Twenty-third street, and the amount paid by him for the conveyance of carcases to the river side. After the system is in full operation, he expects to retire, and in consideration of his patent right to receive a sum of which the legal interest should be equal to half the amount which the Inspector must pay in one year agreeably to the existing contract.

There are in this city at present, 206 slaughter houses, 11 public markets, 531 private markets or butcher shops—in other words, 748 places, in each of which there is generally a greater or less amount of animal matter undergoing decay, and having more or less tendency to vitiate the atmosphere. It is estimated that there are about 365,000 animals annually slaughtered for food in this city, and that 5,000 horses, cows, and other animals, die from disease.

The system of Prof. Hare has been patented and his claims published a few weeks ago in our columns. The principal ingredient used to resolve the animal refuse into manure, and at the same time render it inodorous, is weak sulphuric acid.

### Brazilian Tea.

We have received from the Brazilian Consul some specimens of tea grown in Brazil, where the cultivation of the article has lately progressed with great success. The specimens left with us have been fairly tried, and the quality is declared good. We have tasted a superior article from old Cattray, but, at the same time, we regard the Brazilian production as full of promise, and likely to prove an acceptable commercial article.—[Baltimore Sun.

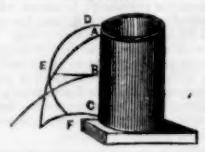
[With the efforts of Mr. Smith in South Carolina, and the efforts of the Brazilians, we suppose that China will have to shut up her tea shop in a few years.]

For the Scientific American.

## Hydraulics.

(Continued from page 136.)

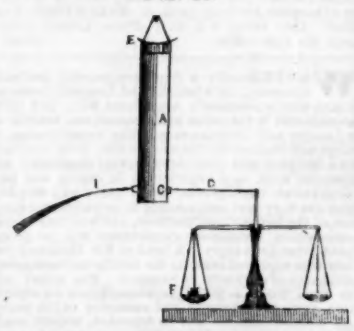
Fig. 20.




The quantity of water discharged from a vessel under the same head is proportioned to the areas of the orifices, and under different heads to the square roots of the heights. In the annexed figure the velocity, and consequently the quantity of water discharged by each orifice, will be as the square roots of their depths. The horizontal distance to which the fluid will reach will be greatest at the centre, B. It would be double the distance of F E and the others, A B C, in proportion to the distance of horizontal lines drawn from the point of discharge to the semicircle, D E F.

Sir Isaac Newton investigated the subject of the escape of fluids from vessels, and suggested a method by which the re-action might be measured. His suggestions were adopted by a gentleman named Mr. Peter Ewart, who made a number of experiments, an account of which is published in the Memoirs of the Manchester (Eng.) Philosophical Society, from which the following ideas are selected :—

Fig. 21.




E is a vessel suspended like a pendulum. A pair of scales were used, and exactly ballanced, and the end of the arm, D, made to touch the vessel. The orifice at C was then opened and the water in the vessel was kept uniformly at the same height by a stream (not shown,) gently coming in at the top. The scale, F, having been raised by the re-action of the jet, weights were put into it as represented, until it was brought into the position in which it was before the orifice was opened. The diameter of the vessel was 7 inches, and the height, B C, exactly 3 feet. He tried orifices of various diameters from 0·35 to 0·7 of an inch, and their exact diameters were ascertained by a micrometer, and the required time for 30 lbs. of water to discharge by each orifice was carefu'ly observed.

When the orifice was made in a thin plate of 1-30 of an inch in thickness, he found the re-action to be greater than Sir Isaac Newton's first conclusion in the ration of 1·14 to 1.—There was some variation in the results of the experiments, but the greatest re-action was as

Fig. 22.


1·16 to 1, and the least is 1·09 to 1, which fall far short of Sir Isaac Newton's last inference. The velocity of the water at the orifice (ascertained by observing the time in which 30 lbs. was discharged) was less than that which a body would acquire in falling freely from B to C, in the ratio of 6 to 1. He found no constant ratio to subsist between the diameter of the contracted vein and that of the orifice; and observing a considerable opacity in the jet, at the contracted vein, he concluded it to be divided into a number of different filaments, and gave up all hopes of ascertaining the actual area of the section of the stream at that place by measuring its diameter. But after repeated trials he found that when the water issued through a contracted hole, G, of the shape represented in fig. 22, the jet was quite transparent, and the re-action (taking the mean of 12 experiments with four different orifices), was less than the weight of a column of water of twice the height of the head, B C, and diameter of the smallest part of the hole, in the ratio of 0·865 to 1. The least re-action was as 0·85 to 1, and the greatest ·88 to 1. By measuring the quantity of water delivered in a given time, he found the velocity of the jet, at the smallest part of the orifice to be less than that which a body would acquire in falling freely from B to C in the ratio of 0.94 to 1.

### Moveable Fire Boxes for Locomotive and Marine Boilers.

It has been satisfactorily ascertained, long since, that where wood as a fuel is more costly than anthracite coal, the use of the coal in the generation of steam, would be a large item of economy. And accordingly, within the last ten years, experiments, made on our principal Railroad and Steam Navigation Lines, have proved that coal can be used for generating steam, with a saving of from 30 to 50 per cent., according to the relative value of wood and coal.

The obstacle, however, in the way of its general introduction, has been found to consist in the fact, that the heat produced by coal, being more intense in the fire box than that of wood, this intense heat, together with the chemical action of the coal upon the lining of the fire box, destroyed it, in a comparatively short period of time; and that although the great saving in the first cost of fuel made the actual cost of the repairs of the fire box, no object; yet, the loss of time occasioned by those frequent repairs was, and still is, a serious evil. For instance: a coal burner in full active duty, may burn out her box in from 6 to 18 months, according to her capacity and service. It would cost from $500 to $1,000 to repair her. This cost, however, is much more than made up by the difference of the cost of coal and wood; but the time consumed in making this repair involves another loss, viz., time in a locomotive when the engine needs no other repairs. To remove these serious objections to the use of the coal, Mr. John J. DeHaven, of Philadelphia, invented what is termed a detatched or moveable *fire-box*, entirely distinct from the engine and boiler; but so attached that it can be separated from it for repairs in the short space of about twenty-four hours, thus avoiding the loss of time incident to such repairs. To test the qualities of this invention, the coal burning locomotive, Henry A. Muhlenberg, of the Columbia and Philadelphia Railroad, was put in service on the 17th October last, and has continued to run without intermission up to the present time, during which period she made thirty-four trips between the head of the Schuylkill Inclined Plane and Columbia, a distance of seventy six miles. This locomotive, when in good repair, burning wood, could draw over the road twenty-one loaded cars, averaging from ten to twelve miles an hour. She has satisfactorily proved, during her recent trials, that she can run from ten to twelve miles per hour, and drawing upwards of twenty-one loaded cars, and burning nothing but anthracite coal.

To do this work, burning wood, requires about two cords: burning coal, one ton and a half. During the whole experiment of thirty-four trips, the fire-box which is attached to the frame and boiler, has remained perfectly firm and works as well as if it were stationary, no inconvenience having arisen in these experiments on account of the box being movable.

### Interesting Chemical Discovery.

At a recent meeting of the Natural History Society of Boston, Mr. Wells, of Cambridge, announced that Mr. Francis H. Storer, a student in the Cambridge Scientific School, had recently discovered at the Cambridge laboratory, iodine in the ammoniacal liquor from the Boston gas works. It was the first time that it had been detected there, and the observation was interesting as showing the probable existence of this substance in the water which has supplied the plants which made up the coal formation.

### American Coal Trade.

No less than 3,127,083 tons of coal were shipped from the Pennsylvania coal regions last year. This although a great amount, is less by 81,380 tons than the produce of 1849.

## LITERARY NOTICES.

Johnston's Agricultural Chemistry.—We have received a copy of this excellent work from the publisher, C. M. Saxton, No. 123 Fulton st. We are glad to see this standard work of the justly celebrated Johnston re-published by Mr. Saxton. Such books are of some use to our country. It commences at the root of the science, namely, the importance of Agriculture, and goes on step by step, until it reaches the very top stone. The work is a collection of Lectures on the subject. The style is simple and clear, and the most abstruse subjects are set forth in a familiar manner. The nature of plants, their elements, food, functions, and their cultivation, is treated in a sensible and masterly manner. The nature of soils, composition, how soils may be changed by art, the uses of lime and all kinds of manures—are subjects which he has fully investigated. The produce of the soil, milk, and the feeding of animals, are also subjects of disquisition. The book contains over 700 pages, is neat and well printed.

Dr. Dixon's Scalpel, No. 2, Vol. 3.—We never look in vain for sterling matter within this, the ne plus ultra of American Quarterlies. There is no mistaking the fact that the Doctor wields an intellectual Damascus of the keenest edge, and with mighty effect. The present number contains the continuation of an article upon architecture, which is well worth attention. "The Artist's Reverie," by James Varick Stout, is, to our mind, one of the finest pieces of imagery ever conceived: it requires careful study to comprehend its legitimate meaning, but it is, nevertheless, full of it. The number, throughout, is brilliant. The Scalpel is published quarterly at $1 per annum.

Shakspeare's Dramatic Works, Phillips, Sampson, & Co., publishers, Boston.—This splendid serial is rapidly approaching completion. Nos. 30 and 31 are issued simultaneously, and contain the dramas of Antheny and Cleopatra, and Julius Cæsar. The embellishments are Cleopatra and Portia, the wife of Brutus, each executed in the highest style of the art. The design and execution of this work reflects credit upon the publishers, and should be well patronized by all who can afford so valuable a copy of Shakspeare's Works. Dewitt & Davenport have the numbers for sale—25 cts. each.

Hunt's Merchants' Magazine, for January, appears upon our table, the first number of the 24th volume. It is one of the most valuable statistical registers extant, and abounds in information indispensable to the merchant and statesman. Few journals compare with it in genuine merit for accurate detail, and we are gratified to know that it receives a liberal patronage. The subscription price of this magazine is $5 per annum. Freeman Hunt, editor, 142 Fulton street.